REMARKS

A. Claim objections – Sequence rules

The Office Action states that the disclosure of the application is objected to because a sequence identifier is not associated with each of the nucleotide and amino acid sequences shown in Figures 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, and 18. In accordance with the suggestion in the Office Action, Applicant has added the corresponding SEQ ID NO's to the appropriate sequences in the "BRIEF DESCRIPTION OF THE DRAWINGS," thereby overcoming the objections.

B. Claim objections – Improper dependent form

The Office Action states that claims 4 and 6-12 are objected to as being of improper dependent form for failing to limit the subject matter of the previous claim. Applicant has canceled claims 6-12 and amended claim 4, thereby overcoming the objections.

C. Claim rejections – 35 U.S.C. §101

Claims 17 and 22 are rejected under 35 U.S.C. §101 as being directed to non-statutory subject matter. According to the Office Action, the claims do not sufficiently distinguish over nucleic acids, proteins, cells, and antibodies as they exist naturally because they do not particularly point out any non-naturally occurring differences between the claimed products and the naturally occurring products. Applicant has canceled claim 22, rendering the rejection moot with regards to this claim. In accordance with the suggestion in the Office Action, Applicant has amended claim 17 by inserting the term "isolated," thereby overcoming the rejection.

Claims 1-12, 15-17, 19-31, and 58 are rejected under 35 U.S.C. §101 as not being supported by a substantial asserted utility or a well established utility. According to the Office Action, the specification speculates possible functions of the SH3D1A gene product, but function cannot be predicted based solely on structural similarity to other proteins. The Office Action also asserts that the present invention has no utility in the detection of megakaryocytic abnormalities because the suggested role of SH3D1A in platelet familial disorder (PFD) is based on detection of SH3D1A overexpression in a single individual.

To the extent that the rejection may be applicable to the amended claims, Applicant respectfully traverses. It is established that the threshold for utility is not high. *Juicy Whip Inc. v. Orange Bang Inc.*, 51 U.S.P.Q.2d 1700, 1702 (Fed. Cir. 1999). An invention is "useful" under 35 U.S.C. §101 if it is capable of providing some identifiable benefit. *Id., citing Brenner v. Manson*, 383 U.S. 519, 148 U.S.P.Q. 689, 695 (1966). An applicant's assertion of utility creates a presumption of utility that will be sufficient to satisfy the utility requirement of 35 U.S.C. §101. See, for example, *In re Jolles*, 628 F.2d 1322, 206 U.S.P.Q. 885 (C.C.P.A. 1980); *In re Sichert*, 566 F.2d 1154, 1159, 196 U.S.P.Q. 209, 212-213 (C.C.P.A. 1977); *In re Langer*, 503 F.2d 1380, 183 U.S.P.Q. 288 (C.C.P.A. 1974); *In re Irons*, 340 F.2d 974, 144 U.S.P.Q. 351 (C.C.P.A. 1965). Unless there is reason to doubt the objective truth of the statements [contained in the specification] which must be relied on for enabling support, a specification's disclosure "must be taken as in compliance with the enabling requirement." *In re Brana*, 5 F.3d 1557, 34 U.S.P.Q.2d 1437 (Fed. Cir. 1995).

M.P.E.P. 2107 (II) states "if at any time during the examination, it becomes readily apparent that the claimed invention has a well-established utility, do not impose a rejection based on lack of utility." This section goes on to state, "An invention has a well-established utility if (i) a person of ordinary skill in the art would immediately appreciate why the invention is useful based on the characteristics of the invention (e.g., properties or applications of a product or process), and (ii) the utility is specific, substantial, and credible."

The nucleic acids of the present invention have at least one well-established utility and/or at least one credible, specific, and substantial utility. For example, the nucleic acids may be used as diagnostic markers for clinical features associated with Down Syndrome.

Down Syndrome is associated with trisomy 21. More specifically, clinical features of Down Syndrome are associated with duplication of the D21S55 to MX1 region of chromosome 21 (Specification, page 2, lines 15-17), which is found in the 21q22 region.

The present invention discloses nucleic acid sequences encoding the SH3D1A gene (formerly known as SH3P17). The SH3D1A gene has been mapped to the q22.2 region of chromosome 21 (Specification, page 3, line 25). A subject having clinical features associated with Down Syndrome will display trisomy for the 21q22 region, meaning that they will necessarily have three copies of the SH3D1A gene. The specification discloses the use of the claimed nucleic acids as probes (Specification, page 17, line 5 – page 18, line 3). By detecting the level of the SH3D1A gene (e.g.,

copy number), the claimed nucleic acids can be used to diagnose Down Syndrome and its related clinical features.

In light of the foregoing, a person of ordinary skill in the art would immediately appreciate that the claimed invention can be used, for example, as a diagnostic marker for clinical features of Down Syndrome, for example by measuring the level (e.g., copy number) of the SH3D1A gene. Such a utility is specific, substantial, and credible. Accordingly, Applicant believes the specification meets the utility requirement of 35 U.S.C. §101 and respectfully requests that the rejections be withdrawn.

D. Claim rejections – 35 U.S.C. §112, first paragraph

Claims 1-12, 15-17, 19-31, and 58 are rejected under 35 U.S.C. §112, first paragraph, based on the lack of utility rejection discussed above. According to the Office Action, since the claimed invention is not supported by a specific and substantial or well established utility, one skilled in the art would not know how to use the claimed invention. Applicant respectfully traverses. As discussed in Section C of the present response, the claimed invention can be used, for example, for diagnosing clinical features associated with Down Syndrome. Therefore, Applicant requests that this rejection be withdrawn.

Claims 1, 3-12, 15-17, 19-31, and 58 are rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. According to the Office Action, the claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors had possession of the claimed invention at the time the application was filed. Specifically, the Office Action states that claims 1, 3-12, 15-17, 19-31, and 58 are

drawn to a genus of nucleic acid molecules encoding a genus of polypeptides "comprising" "a fragment" of SEQ ID NO:2, or a genus of vectors comprising said nucleic acid molecules, host cells comprising said vectors, and methods of producing polypeptides using said host cells. According to the Office Action, claims 1, 3, and 4 recite a nucleic acid encoding a polypeptide fragment, but no function is associated with this polypeptide fragment. Applicant has amended the claims by removing the phrase "or a fragment thereof," thus overcoming this aspect of the rejection.

The Office Action next states that although claims 5-12 recite specific fragments of SEQ ID NO:2, they fail to meet the written description requirement because they do not specify the function associated with these fragments. Applicant has canceled claims 5-12, rendering this aspect of the rejection moot.

The Office Action goes on to state that claims 17, 19, and 20, which recite oligonucleotides, do not meet the written description requirement because they are interpreted as encompassing not only PCR primers, but also PCR products, which could include allelic variants or other isoforms. Applicant has amended claim 17 to recite a nucleic acid that is complementary to the nucleic acid of claim 1 over the entire length of the nucleic acid of claim 1, thereby overcoming this rejection.

Finally, the Office Action states that the antisense molecule recited in claim 22 does not meet the written description requirement because the term "antisense" is interpreted as encompassing not only molecules that hybridize to the nucleic acid of SEQ ID NO:1, but also to molecules that hybridize to SH3D1A flanking regions. Applicant has canceled claim 22, rendering the rejection moot with regards to this claim.

Claims 1-12, 15-17, 19-31, and 58 are rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. The Office Action states that the nature of the claimed invention is interpreted as drawn to SEQ ID NO:1 for use in detection of megakaryocytic abnormality. According to the Office Action, the data presented in the specification is not sufficient to convince one skilled in the art that FPD or any other megakaryocytic abnormality is necessarily linked to expression of the SH3D1A gene.

To the extent that the rejection may be applicable to the amended claims, Applicant respectfully traverses. The invention is drawn to nucleic acids encoding the amino acid of SEQ ID NO:2. Further, the use of these sequences is not limited to detecting megakaryocytic abnormalities by measuring expression of SH3D1A. As discussed in Section C of the present Response, the claimed invention may be used, for example, to diagnose clinical features associated with Down Syndrome due to the localization of the SH3D1A gene to the 21q22 region of chromosome 21. For instance, the specification discloses that duplication of the 21q22 region is associated with Down Syndrome, and that the SH3D1A gene maps to this region. The specification also discusses the use of the claimed sequences as probes.

In light of this information, the specification enables one skilled in the art to use the claimed sequences in the detection and diagnosis of clinical features associated with Down Syndrome by measuring the level of SH3D1A genes (e.g., copy number) in a sample.

The Office Action states that claims 27-29 as written are broadly interpreted to encompass host cells which are not isolated and are comprised within an organism,

and as such they are not enabled. In accordance with the suggestion in the Office Action, Applicant has amended claims 27-29 to recite the term "isolated' before the term "host cell."

The Office Action goes on to state that the specification discloses an antisense for preventing or diminishing the expression of the SH3D1A gene, but does not teach which disease would benefit by preventing or diminishing expression of the SH3D1A gene. As such, the Office Action asserts that claim 22, which recites an antisense molecule, is not enabled. Applicant has canceled claim 22, rendering this rejection moot.

E. Claim rejections – 35 U.S.C. §112, second paragraph

Claim 6 is rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Applicant has canceled claim 6, rendering this rejection moot.

F. Claim rejections – 35 U.S.C. §102

Claims 1, 3, 4, 6, 9-12, 15-17, 19-31, and 58 are rejected under 35 U.S.C. §102 as being anticipated by WO 96/31625 (Sparks et al.). According to the Office Action, Sparks et al. teach an isolated DNA encoding an amino acid sequence comprising residues 684-1143 of the present SEQ ID NO:2. To the extent the rejection is applicable to the amended claims, Applicant respectfully traverses. The amended claims recite nucleic acids encoding the amino acid sequence of SEQ ID NO:2, full-length complementary nucleic acid sequences, and vectors and host cells comprising these nucleic acid sequences. Sparks et al. disclose a nucleic acid sequence 1389 nucleotides in length encoding a 462 amino acid sequence. However, Sparks et al. do

not disclose a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:2, much less the nucleotide sequence set forth in SEQ ID NO:1. Thus, Sparks et al. do not anticipate the claims of the present invention.

Claims 1, 3-12, 15-17, 19-26, and 58 are rejected under 35 U.S.C. §102 as being anticipated by Chen and Antonarakis. According to the Office Action, Chen and Antonarakis teach two YAC clones between markers D21S319 and D21S65 which appear to contain the entire SH3D1A gene plus several others.

To the extent that this rejection is applicable to the amended claims, Applicant respectfully traverses. Chen and Antonarakis use an exon (hmc02a08) mapping to chromosome 21 to probe cosmids and YACs. This exon, which displays a sequence identity to GenBank entry U61166, encodes an amino acid sequence identical to a partial sequence of SEQ ID NO:2 (residues 652-727). However, Chen and Antonarakis do not teach the amino acid and nucleotide sequences set forth in the present application. As such, Chen and Antonarakis do not anticipate the claims of the present invention. In light of the foregoing, Applicant respectfully requests that the rejections be withdrawn.

CONCLUSION

In view of the foregoing, it is submitted that the present claims are in condition for allowance. Accordingly, Applicant respectfully requests that a Notice of Allowance be issued.

Respectfully submitted,
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